**Preliminary**
**TECHNICAL DATASHEET #TDAX020700**

# HYDRAULIC VALVE CONTROLLER – 24 I/O

**5 Analog and 6 Digital Inputs**
**1 Temperature Sensor and 1 RPM Sensor Interface**
**2 PWM Inputs**
**6 Proportional and 4 ON/OFF Current Outputs**
**RS232 and CAN ports**
**P/N: AX020700 SERIES**

## Description:

The hydraulic I/O controller provides precise, repeatable control of 6 proportional and 4 on/off solenoid valves (or other combination). Valve current control is based on 1 temperature sensor input, 1 RPM sensor input, up to 2 PWM inputs, up to 5 universal analog inputs (0-5V, 0-10V, 0-20mA or 4-20mA) and/or up to 6 digital inputs. Two +5V references are available to power the analog input devices. The robust design accepts 9…32V power supply input and is packaged in an IP67 rated housing with 48-pin connectors. The controller is designed for remote mounting. RS-232 port interfaces to PC with Tera Term freeware for user configuration and diagnostics. Optional CAN communications permit networking.

Many hydraulic control applications in harsh environments can be accommodated with this hardware and application-specific software.

## Ordering Part Number:

**AX020700 Series**
*OEM versions with application-specific software are available on request.*

## Technical Specifications:

*The specifications represent a particular hardware platform. Application-specific software is provided.*

### Input Specifications

| | |
|---|---|
| Power Supply Input - Nominal | 12 or 24VDC nominal; 9…32 VDC power supply range |
| Reverse Polarity Protection | Provided |
| **Analog Inputs** | |
| Temperature Sensor Input | 1 thermistor input (100 Ohm to 100 Kohm)<br>User specifies sensor, range of temperature control and setpoints |
| Sensor Ground | Temperature sensor ground connection is provided. |
| Analog Inputs | 5 analog inputs available<br>0-5V, 0-10 VDC, 4-20 mA, 0-20 mA |
| Analog Ground | Four analog ground connections are provided. |

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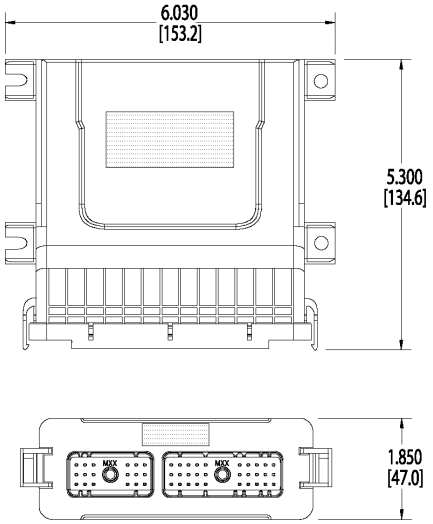
| **Frequency Inputs** | |
|---|---|
| PWM Pulse Input | 2 PWM pulse – low/high pulse up to 10 kHz<br>Adjustable from 0-100% Duty Cycle (5-95% default)<br>For example, the controller could interface to an active sensor (hall effect) for pulse input (Engine RPM) or to a PWM signal from an engine ECM. |
| PWM Ground | A PWM ground is provided. |
| Active Sensor | Using the 2nd PWM input pin, the controller can interface with an active sensor.<br>Power is provided to the sensor from one of the +5V reference voltages. |
| Passive Sensor | The controller can interface with a passive sensor (inductive pick up)<br>such as a magnetic speed sensor. |
| **Digital Inputs** | |
| Digital Inputs | 6 digital inputs available<br>(Active Low or Active High is software selectable) |
| Digital Ground | A digital ground connection is provided. |

## Output Specifications

| | |
|---|---|
| Maximum Current Output<br>(High frequency PWM output) | Six independent outputs (up to 2A) for proportional valves<br>Specify outputs required upon ordering (factory programmed).<br><br>Overcurrent protection is provided<br>Short circuit protection is provided. |
| Digital Output | Four outputs (2A max.) for ON/OFF valves |
| Reference Voltage | Two +5V, 50 mA (Protected against GND and Power Supply connections)<br>One +5V for Analog Input 1 |
| Output Current Adjustments | I-max. (specified by user – set in software)<br>I-min. (specified by user – set in software)<br>All current settings are adjustable from 0 to 2 Amps. |
| Superimposed Dither | Dither Amplitude:<br>10% I-max. (fixed)<br>Dither Frequency:<br>200 Hz (factory default); Adjustable from 70-350 Hz |
| Ramp Rate | Ramps (specified by user – set in software)<br>Adjustable from 0-5 seconds. |

## General Specifications

| | |
|---|---|
| Microprocessor | DSP56F8346 |
| Control Logic | Application – specific software provided |
| CAN Interface | 1 CAN port<br>Bosch Controller Area Network Specification (CAN 2.0B)<br>Software support for SAE J1939 stack (on request)<br>CANopen and other higher level protocols on request. |
| Interface | RS-232 port for setpoint configuration, software upgrade and diagnostics.<br>RS232 serial communication interfaces to a serial port (i.e. COM1) on a PC<br>(115200 Baud Rate, N81, Xon/Xoff Flow Control)<br>Tera Term or Microsoft HyperTerminal™ or an equivalent data terminal |
| Electrical Connections | 48 pin<br>Cinch ModICE receptacle (p/n: 581 01 48 005)<br>Mating plug: SHS (p/n: 581 01 18 023)<br>*Mating plugs are provided with prototypes only.*<br>**Use dielectric grease on the pins when installing the controller.** |
| Packaging and Dimensions | High Temperature Nylon housing<br>Cinch ModICE small enclosure (p/n: 581 01 30 04X)<br>6.03 x 5.30 x 1.85 inches 153.20 x 134.60 x 47.00 mm<br>(W x L x H excluding mating plug) |
| Operating Conditions | -40 to 85°C (-40 to 185°F) |
| Vibration | Vibration compliance is suitable for mobile equipment applications. |
| Protection | IP67; Unit is conformally coated within the housing. Plugs carry an IP69 rating. |




**Connections (Typical):** Refer to installation instructions for a specific part number for actual pin out.

| 18-pin Connector | | 30-pin Connector | |
|---|---|---|---|
| **Pin #** | **Function** | **Pin #** | **Function** |
| 31 | Proportional Solenoid 1+ | 1 | CAN High (on request) |
| 32 | Proportional Solenoid 2+ | 2 | Digital Input 1 |
| 33 | Proportional Solenoid 3+ | 3 | Digital Input 2 |
| 34 | Proportional Solenoid 4+ | 4 | Digital Input 3 |
| 35 | Proportional Solenoid 5+ | 5 | Digital Input 4 |
| 36 | Proportional Solenoid 6+ | 6 | +5V Reference (Protected) |
| 37 | Power_GND | 7 | +5V Reference (Protected) |
| 38 | Power_GND | 8 | Analog Input 2 |
| 39 | Power_GND | 9 | Analog Input 3 |
| 40 | Power_GND | 10 | +5V Reference for Analog Input 1 |
| 41 | Power_GND | 11 | CAN Low (on request) |
| 42 | Power_GND | 12 | Digital Input 5 |
| 43 | Battery + | 13 | Digital Input 6 |
| 44 | Battery -/Power_GND | 14 | Temperature Sensor Input |
| 45 | ON/OFF Output 1 | 15 | Passive Sensor Input (Inductive Pickup Sensor) |
| 46 | ON/OFF Output 2 | 16 | PWM Input 1 |
| 47 | ON/OFF Output 3 | 17 | PWM Input 2 (Active Sensor) |
| 48 | ON/OFF Output 4 | 18 | Analog Input 4 |
| | | 19 | Analog Input 5 |
| | | 20 | Analog Input 1 |
| | | 21 | RS-232 Transmit (DB-9 Female, pin 2) |
| | | 22 | RS-232 Receive (DB-9 Female, pin 3) |
| | | 23 | RS-232 GND (DB-9 Female, pin 5) |
| | | 24 | Analog GND (Temperature Sensor GND) |
| | | 25 | Analog GND (Passive Sensor GND) |
| | | 26 | Analog_GND |
| | | 27 | Analog_GND |
| | | 28 | Analog_GND |
| | | 29 | Analog_GND |
| | | 30 | Analog Input 1_GND |

## CAN communications:

Contact the manufacturer for details.

## RS-232 communications:

For further details refer to the user manual for the specific part number.

Using a PC and Tera term freeware, the user can select between displaying system parameters, changing system parameters, setting the default values, loading new software and showing the internal state of the controller (diagnostics).

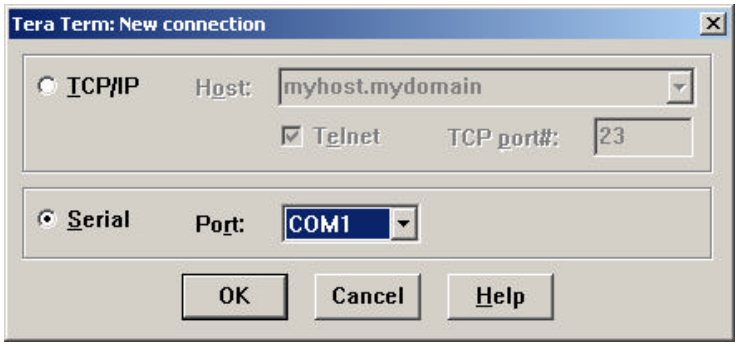
NB. Tera term is freeware and is downloadable from
http://hp.vector.co.jp/authors/VA002416/teraterm.html.

### 1. Setting Up PC Communications to the Controller

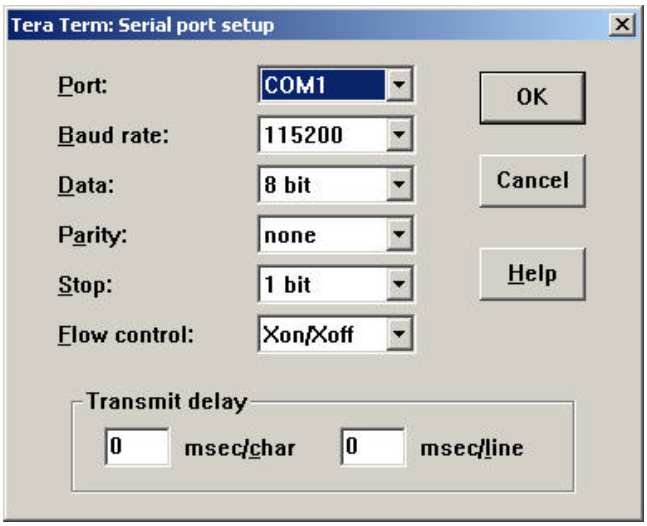
- Connect an RS-232 to DB-9 cable adaptor to the controller and a PC.
- Use a stable power supply. **With the power supply OFF**, connect the controller Power- to the power supply Ground, and the Power+ to the power supply +.

- Open Tera Term Pro, and set it up.
  (Free downloadable from http://hp.vector.co.jp/authors/VA002416/teraterm.html)

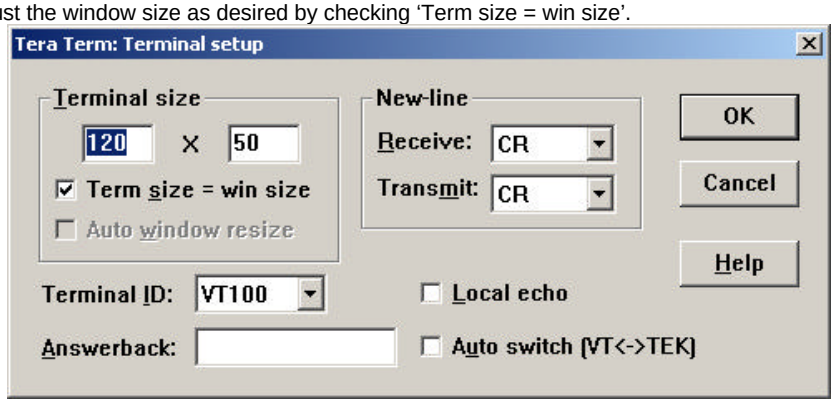
- Select Serial with the appropriate COM port.



- Go to Setup/Serial Port and change the settings exactly as shown below.




- Go to Setup/Terminal and verify that New-line Transmit and Receive are CR.
- Adjust the window size as desired by checking 'Term size = win size'.




**2. Configuring the Controller - Main Menu**

- **To access the main menu for existing software, turn ON power to the controller.**
- Follow the prompts on the screen to view or to change the configurable parameters.

*For further details on configuration, refer to the user manual provided with a specific controller part number.*